Contribution ID: **45** Type: **Poster Only**

Localizing Low-Grade Heat Utilizing Infrared Plasmonic Dimers

Plasmonics has profoundly improved our ability to confine light and energy to regions far below the diffraction limit. There is intense recent interest in utilizing infrared-active plasmonic materials to direct infrared energy at the nanoscale and to tailor the material properties via interaction with low-frequency phonons. Furthermore, when resonant in the IR plasmonic structures can couple to substrate phonons and thermally populate localized surface plasmon resonances (LSPRs). While visible plasmons have been extensively studied using electron spectroscopy performed inside a scanning transmission electron microscope (STEM), expanding these studies to the infrared requires a highly monochromated STEM. Using the Nion Hermes 100 MAC-STEM at Oak Ridge National Laboratory, we previously imaged the localization of thermal gain around gold nanorods using electron energy gain spectroscopy (EEGS). More recently, we are performing in-situ heating experiments on more complex systems of nanorod and bowtie dimers. These samples were created with electron beam lithography (EBL), featuring lengths in the micron range and a nanogap of approximately 20 nm. Upon heating to 900℃, we observed thermal population of plasmonic hot spots in the gaps. In this way, diffuse thermal energy was concentrated into an LSPR that could later be coupled with an emitter or other plasmonic structures to extract energy from the system.

Topical Area

Emerging research and multimodal techniques

Author: DUDDY, Gordon (University of Notre Dame)

Co-authors: Dr SRIJANTO, Bernadeta (CNMS); Prof. MASIELLO, David (University of Washington); Dr CAMDEN, Jon (University of Notre Dame); Dr HACHTEL, Jordan (CNMS)

Presenter: DUDDY, Gordon (University of Notre Dame)